



**MATCHING AND POSITIONING SYSTEM  
FOR MOBILE UNITS IN COMMUNICATION NETWORKS**

Technical Field

5           The present invention relates to a method that allows users to be notified when other like-minded individuals are in the proximity while keeping private information and the user identity secret.

10 Background and Summary of the Invention

          When an individual user is at a certain location, it may be of interest to find and/or locate other individuals that may be playing a certain game or match a certain pattern of interests or personality traits. However, the positioning information and the matching criteria may be confidential and sensitive information that should not be publicly available. There is currently no suitable way to be alerted or find out the location of other like-minded individuals while systematically separating public and private information in communication networks so that the private information is concealed from the public but without impeding the exchange of public information or the transmission of messages. The private information could for example include the user's true identity, location, financial status, sexual orientation or any other sensitive and personal data.

          The present invention is using location information extracted from communication networks, such as mobile devices connected in wireless networks, keeping all private information confidential while allowing users to interact with one another. More particularly, the present invention is a method of notifying subscribers in communication networks about the proximity of other subscribers that has a certain matching profile. A clearinghouse unit is in communication with service providers and operators of communication networks. The clearinghouse unit has a client database, a position

database and a match database. Encoded versions of the client database are sent to the operators. The client database comprises matching profile parameters for each client of the client database. The operators receive  
5 the encoded versions and assign unique operator identification codes to the clients included in the encoded version of the client database. The operator identification codes are different from the real universal identification of each client. The operators  
10 determine the real time positions of each client and send position signals to the position database. The position signals comprise the operator identification codes, the matching profile and the real time positions of each client. The clearinghouse unit conducts a search in the  
15 position database and sends notification signals to the operator when the matching profile parameters of, for example, a first client matches the matching profile parameters of a second client and the first client is located in a proximity of the second client. The  
20 operators notify the first and second clients of the matching profile parameters and the proximity of the location of the first and second clients. When the matched first and second clients provide a positive reply, the clearinghouse unit can grant the service  
25 provider access to the details it needs in order to run the correct service application with the correct clients.

#### Brief Description of the Drawings

Fig. 1 is a schematic system overview showing  
30 the system components and external systems/components of the present invention.

Fig. 2 is schematic system overview showing the signal flow between the different components of the systems of the present invention;

35 Fig. 3 is a schematic view of a client database of the present invention;

Fig. 4 is a schematic view of an encoded version of the client database document of the present invention;

Fig. 5 is a schematic view of a positioning database of the present invention; and

Fig. 6 is a schematic view of the match database of the present invention.

#### Detailed Description

10 With reference to Figs. 1-6, the present invention is a system 10 for separating public and private information in communication networks while permitting communication between subscribers to the communication networks. More particularly, the system 10  
15 has clients/subscribers/users 12, 14 connected via the Internet 16 to a set of service providers 18, 20, 22. The service providers may provide a whole range of services including, but not limited to, dating services, games and entertainment services, role playing games,  
20 fan clubs for artists and instant messaging services for member of buddy lists.

Each service provider is connected to a match database 24 of a clearinghouse unit 26. The database 24 is connected to a position database 28 that, in turn, is  
25 connected to a set of operators 30, 32, 34. The clearinghouse unit 26 also has a client database 36 that is connected to the operators 30, 32, 34. The operators are each connected to communication networks 38, 40, 42, respectively. By using the system 10, it is possible to  
30 maintain personal profiles and location of the users 12, 14 anonymous while enabling the users to connect based on the personal profiles and real time location, as described in detail below. In other words, the system 10 enables secure user-to-user location related services  
35 that are based on the positioning capabilities of the communication networks 38, 40, 42 and the communication with wireless electronic devices 39, 41 that are

connected to one or more of the networks 38, 40, 42.

An important feature of the system 10 is that it provides the users 12, 14 with full privacy and personal integrity while using the services provided by the system 10.

5           The positioning capabilities of communication networks 38, 40, 42, such as GSM or UMTS telephone networks, Bluetooth technology, wireless LAN and GPS, make it possible to know the real time position of the users 12, 14 of electronic devices 39, 41. The  
10 possibility of identifying the location of users of, for example, mobile telephones or other communication devices, may be used to more effectively manage a fleet of vans for delivery services or vehicles for emergency situations, such as ambulances. By knowing the position  
15 of a fleet of emergency vehicles, the closest available vehicle may be alerted in response to an alarm to go to the place of an accident. As long as these services are offered to one entity such as a company or an organization, the integrity issues are limited to the  
20 relation between the entity (a company) and the users (the employees) of the positioned devices. However, when this is not the case, the integrity issue becomes critical. If the communicating devices are positioned by different positioning providers, for example wireless  
25 operators, inter-operability between networks may also become a problem issue.

          In order to be able to provide inter-operable user-to-user services or other dynamic positioning and matching services, the privacy and integrity issues have  
30 to be resolved. An important feature of the present invention is that the system 10 provides user-to-user interaction applications for several devices in relation to one another with full privacy and integrity for the users, as described in detail below.

35           With reference to Fig. 1, each network operator 30, 32, 34 is serving a plurality of users 12, 14 of mobile communication units, such as mobile phones,

connected to location enabled communications networks, such as a cellular network. Of course, any suitable devices or communications network may be used and the present invention is not limited to cellular systems.

5 The networks (or the devices) 38, 40, 42 should be able to generate positioning information and to distribute notification messages to the mobile telephone users 12, 14. The operators 30, 32, 34 may also include foreign roaming partners of the telephone operators or operators  
10 of any communications network such as UMTS, WLAN and Bluetooth. Each operator 30, 32, 34 holds a customized and encoded version 31, 33, 35, respectively, of the client database 36. The version 31 only includes the subscribers of the operator 30, the version 33 only  
15 includes the subscribers of the operator 32 and the version 35 only includes the subscribers of the operator 34. In this way, there is no risk that one operator will obtain information about another operator's subscriber list and no operator will know whether or not  
20 subscribers/users of the communication services provided by other operators are using the services provided by the clearinghouse unit 26. The servers of each operator 30, 32, 34 that hold the encoded versions 31, 33, 35 of the client database 36 may request location information  
25 from the operator's location server or system with the equivalent functionality.

The service providers 18, 20, 22 may be connected to the clearinghouse unit 26 via a medium that allows the entries in the match database 24 to be  
30 transmitted to each requesting service provider 18, 20, 22, as required. The service providers 18, 20, 22 may be part of one or many of the operators 30, 32, 34 or be independent from any entity that operates a communication network. When the users 12, 14 would like to gain access  
35 to the services provided by the service providers 18, 20, 22, each user may enter whatever data is needed to use the services by using either a PC-based browser, a phone

based browser or any other suitable device, software or method to make this data available to the particular service provider. To encourage the users 12, 14 to provide sensitive information to the clearinghouse unit 26 and/or the service providers 18, 20, 22, the users may be provided with a tool to easily change, erase or remove the personal information should the user decide to change or terminate the subscription of the services. The user may also have full control over his/her personal information via a web application. For example, the user may de-activate or re-activate certain services, profile entries in the various database or the entire profile at the user's own discretion. The modification or eradication of the information in the database may also be performed via a mobile telephone unit by making a telephone call to a service center of the clearinghouse unit or service provider, by sending a short message or by using a suitable browser.

The service providers 18, 20, 22 may transfer relevant portions of the sensitive personal information provided by each user to the clearinghouse unit 26 where it may be stored in the client database 36. The client database 36 may include a variety of information to identify the users 12, 14 and his/her personal profile information including, but not limited to, a clearinghouse identification 44 (CH\_ID) that is uniquely used by the clearinghouse unit 26, a universal unique user identification 46 (UUU\_ID) that is of a general nature such as the international GSM telephone number or IP address of the user and a service provider identification 48 (SP\_ID) that is uniquely used by the service providers 18, 20, 22 and a operator identification 49 (OP\_ID) that is uniquely used by the operators 30, 32, 34. The identification 49 may be designed to be valid only for a limited time. The identification 49 is the identity used in communication between clearinghouse unit 26 and the operators 30, 32,

34. Only the operators can relate the identification 49, or any other identification code that is related to the individual user, to the universal identification 46. The fact that the various entities of the system 10 rely on  
5 different identification codes to identify the same users and/or profile information is an important feature of the present invention to keep the sensitive information secret because an identification code created and used by one unit of the system is not available to another unit  
10 of the system.

With reference to Fig. 3, the client database 36 includes the clearinghouse identification 44, the universal identification 46 and the service provider identification 48. The database 36 also includes a  
15 matching profile 50 (MATCH\_PROFILE) which may be a pattern of parameters for a particular user's interest that match the interest of other users. For example, if the user is Swedish but lives in the United States, the user may be interested in coming into contact with  
20 Swedish-Americans in the vicinity. The system 10 may then automatically alert the user when another Swedish-American is in the proximity. The matching may be based on a membership of a buddy list, gaming community, chat group or the search profile in a dating service. The  
25 match profile only includes a sufficient amount of information to carry out the search or contact request of a user. The reason for keeping the amount of information of the match profile 50 limited is to minimize the information sent from the clearinghouse  
30 unit 26 to the operators 30, 32, 34 and the service providers 18, 20, 22. For example, if the service providers are providing a role play game, it is important that the opponent knows as little as possible about the various resources and strength possessed by the  
35 approaching game participant/user. Additionally, the personal privacy and integrity of the user are better protected if only the specific search or contact

requirements of the user are sent to one of the operators 30, 32, 34. The database may also include a name 53 (NAME) of the user, such as a nickname or the real name and an et cetera column 55 for any additional  
5 required information such as address information.

Fig. 4 shows the encoded version 31 of the client database 36. The versions 33 and 35 look identical but contain information about different subscribers. The version 31 includes the operator  
10 identification 49, the clearinghouse identification 44, the universal identification 46, the service provider identification 48 and the matching profile 50. The identification 49 is assigned to a string of coded information, such as the identifications 44, 46, 48 and  
15 the profile 50, so that the operator can keep track of the received information.

With reference to Fig. 5, the position database 28 may include the operator identification 49, the matching profile 50 and position information 52 of  
20 a particular user. The position information 52 may be expressed in any suitable format such as longitude/latitude, x-/y-coordinates or a proprietary format.

With reference to Fig. 6, the match database 24 may include a match identification 54 (MATCH\_ID), match  
25 information (MATCH\_INFO) 56 and the service provide identification 48. The identification 54 is the reference number of an individual match, i.e., one occurrence of a pair of matching profiles at the same place and at the same time. The match information 56  
30 includes the matching parameters so that it is known why the match was made. The operator identification 49 is only provided to the service provider or service providers when a reply has been received from the users, as described below.

35 In operation, the client database 36 sends the encoded version 31 in a signal 60 to the operator 30, the encoded version 33 in a signal 62 to the operator 32 and

the encoded version 35 in a signal 64 to the operator 34. Due to the encoding of the database information sent to the operators 30, 32, 34, it is impossible for the operators to know the full content of the personal  
5 profile of the particular client/user by looking at the encoded version of the client database 36. Thus, it is not necessary to entrust the operators 30, 32, 34 with details of the personal profiles in the versions 31, 33, 35, respectively. The encoded version of the client  
10 database 36 is updated on a regular basis in order for changes in the client database 36 to take effect at the encoded versions 31, 33, 35 of the operators 30, 32, 34, respectively.

Each personal profile in the encoded version  
15 received by a operator from the database 36 is assigned a new identification such as the operator identification 49 described above. The identification 49 may be a disposable sequence number and the connection between the operator identification 49 and the universal  
20 identification 46 is only known to the operators 30, 32, 34.

Once the encoded version of the client database 36 is updated, the servers of the operators 30, 32, 34 may request the positions of the users from the  
25 location enabled communications networks 38, 40, 42 operated by the operators 30, 32, 34. The encoded personal profile information that is sent to the operators may contain instructions about when such a location request should be made. Most communication  
30 services have the capability of providing intermittent and even a continuous stream of position information for at least a limited period of time. More particularly, since the operator 30 has obtained the requested positioning information via the network 38, the operator  
35 30 may send continuous position signals 66 to the position database 28. The signals 66 include position information in real time of the subscribers, included in

the encoded version 31, at certain time intervals. As explained earlier, the encoded version 31 only includes information related to the subscribers of the services provided by the operator 30. Similarly, the

5 operators 32, 34 send position signals 68, 70 to the position database 28. Preferably, the information in the position signals 66, 68 and 70 is made anonymous before it is sent to the position database 28 to maintain the privacy of the subscribers. The clearinghouse unit 26

10 continuously searches the position database 28 in real time to look for posts with matching location parameters (x- and y-coordinates), time and personal profile. In other words, the search engine tries to match the matching profile information 50 with the position

15 information 52.

The matches that are found in the position database 28 generate the match identification 54 and match information 56 that may be posted in the match database 24 by sending a match signal 72 from the

20 database 28 to the match database 24 where the responses from the users are awaited. The posted entries in the match database 24 have an open field for the operator identification 49 that cannot be filled in until the users 12, 14 have replied.

25 As best seen in Fig.2, when a match occurs, a predefined notification signal 74 including the operator identification 49 may be sent to the operator 30 if the match relates to a subscriber of the operator 30. Similarly, a notification signal 76 may be sent from the

30 position database 28 of the clearinghouse unit 26 to the operator 32 if the match relates to a subscriber of the operator 32. The operators 30, 32 may, in turn, send notification signals 78, 80, such as a SMS message or any other suitable type of message, to the subscribers 12,

35 14, respectively, to notify the subscribers that a match has occurred and which matching parameters were satisfied. In order to translate the identification 49

into the universal identification 46, each operator uses its encoded version of the client database to match the operator identification 49 with the universal identification 46 so that the users may be contacted.

5           If the subscribers/users 12, 14 would like to engage in some kind of interaction with one another, the users 12, 14 may send reply signals 82, 84 back to the operators 30, 32. This assumes that no subscriber of the services of the operator 34 is involved in the matching  
10 search results. The reply information from the users 12, 14 may be forwarded by each operator 30, 32 to the position database 28 of the clearinghouse unit 26 in signals 86, 88. Once the reply information in signals 86, 88 are received by the database 28, this is  
15 the first moment in the course of the process when the identities of the users 12, 14 can be made available to the clearinghouse unit 26. It should be noted that the revelation of the user identities should, preferably, never happen before there is a reply from the users 12,  
20 14 indicating that the users 12, 14 would like to interact with one another. In some cases, it may be desirable to postpone the disclosure of the user identities even further. The service provider identification 48 may now be posted in the match  
25 database 24 to make the entry in the match database 24 complete.

          The complete entry in the match database 24 may now be sent to the relevant service provider 18, 20, 22 where it is used to deploy the correct applications for  
30 the further interaction between the users 12, 14. At this point, the selected service providers may take over due to the information of the activation signals that were sent to the service providers so that the service provider may provide whatever service applications the  
35 users 12, 14 need in order to get a rich user experience.

          More particularly, depending on the type of service required by the users 12, 14, the match

database 24 of the clearinghouse unit 26 may generate activation signals 90, 92, 94 to the service providers 18, 20, 22, respectively. For example, if only the services from the service provider 20 are  
5 required by the users 12, 14, then the service provider 20 sends initiation signals 96, 98 to the users 12, 14, respectively, to activate the service required. It may be possible to only include the match identification 54 and the match information 56 in a first  
10 notification signal to the service provider in case the service provider needs to send some routine messages or prepare the services prior to receiving the service provider identification information. The service provider identification 48 may be provided once the  
15 required positive replies from the users 12, 14 are obtained. However, before the service provider 20 sends out the signals 96, 98, the position database 28 may have forwarded the reply received from the user 14 back, via the operator 30, to the user 12 and forwarded the reply  
20 received from the user 12 back, via the operator 32, to the user 14 so that each user is aware that further communication via the particular service provider may take place. One common situation is that the service provider 20 would receive all three components at the  
25 same time, i.e., the match identification 54, the match information 56 and the service provider identification 48 so that the users may be contacted by the service provider. It should be noted that it is possible for the users 12, 14 to exchange several messages over an  
30 anonymous channel if that is a desired service feature. For example, in a dating services the users 12, 14 may initially wish to remain anonymous until they have chatted for a while. Once the users 12, 14 are comfortable about revealing each other real identities,  
35 the users may communicate directly via a two-way signal 100, if desired. It is also possible for the users to be either active or passive participants. An

active profile may include the instruction to let the user know about a match and to let the other party or parties know about the match also. A passive profile may include the instruction that the other party may be notified about the match but that the user herself does not want to be notified. It is also possible to provide the instruction that only the user should be notified about the match but the other party should not yet be notified that the user is in the proximity.

By using the method of the present invention, no private information has been released to any party unless the owner of the information has ordered it or provided a response to a request. There is no need for standing orders and the users decide for each occasion whether or not to communicate or share information with others. However, the flow of location information of the users can be made continuous which is important in order to make services user friendly and quick.

The only entity the users must trust with the location information is the network operators 30, 32, 34 to whom this information is entrusted even without the signal flow of the present invention. This is compliant with the emerging guiding principles for integrity regulations concerning location information in several major markets.

Each contributing party, i.e., the operators 30, 32, 34, the clearinghouse unit 26 and the service providers 18, 20, 22 are only granted access to the information each party needs for each step in the process to make the services available to the users 12, 14.

By not making the clearinghouse unit 26 a part of any organization or system of the operators 30, 32, 34 or service providers 18, 20, 22, the method of the present invention provides an open platform for interoperability between several networks and services in a

way that will maximize the value to users while eliminating the problem of cooperation between competitors.

There are several ways to use the present innovation. For example, a mobile unit from a blood bank can activate its profile at arrival to a certain place and automatically notify all users that are signed up as blood donors. Since the notification is based on the actual presence, the notification will reach all the users that are present in the vicinity of the area and only those users are notified, not people normally working or living in the area. The blood donor will only be noticed by the mobile unit from the blood bank if she replies to the message and thus chooses to make herself known to the blood bank. Another example is that a number of different location based games can be played without the need for making manual requests over and over again with no guarantee what so ever that the requests will lead to any game action. Thirdly, dating games and dating services can be offered without having to sacrifice the personal privacy and integrity of either part. Another example is that mobile buddy lists can be made location-enabled without extensive problems when granting friends permission to locate the user or even worse cause intrusion of the user's privacy and integrity.

While the present invention has been described in accordance with preferred compositions and embodiments, it is to be understood that certain substitutions and alterations may be made thereto without departing from the spirit and scope of the following claims.

I claim:

1. A method of notifying subscribers of communication networks, comprising:
  - providing a clearinghouse unit (26) in communication with a service provider (18, 20, 22) and an operator (30, 32, 34) of a communication network (38, 40, 42), the clearinghouse unit (26) having a client database (36), a position database (28) and a match database (24);
  - 10 sending an encoded version (31, 33, 35) of the client database (36) to the operator (30, 32, 34), the client database (36) comprising matching profile parameters (50) for each client (12, 14) of the client database (36);
  - 15 the operator (30, 32, 34) receiving the encoded version (31, 33, 35) and assigning a unique operator identification code (49) to each client (12, 14) included in the client database (36), the operator identification code (49) being different from a real universal
  - 20 identification (46) of each client (12, 14);
  - the operator (30, 32, 34) determining a real time position (52) of each client (12, 14);
  - the operator (30, 32, 34) sending a position signal (68, 70, 72) of each client (12, 14) to the
  - 25 position database (28), the position signal (68, 70, 72) comprising the operator identification code (49) and the real time position (52) of each client (12, 14);
  - the clearinghouse unit (26) conducting a search in the position database (28);
  - 30 the clearinghouse unit (26) sending a notification signal (74, 76) to the operator (30, 32, 34) when the matching profile parameters (50) of a first client (12) matches a matching profile parameters (50) of a second client (14) and the first client (12) is located
  - 35 in a proximity of the second client (14);
  - the operator (30, 32, 34) notifying the first and second clients (12, 14) of the matching profile

parameters (50) and the proximity of the first client (12) to the second client (14);

the first and second clients (12, 14) providing the clearinghouse unit (26), via the operator (30, 32, 5 34), with a positive reply (80, 82); and

the clearinghouse unit (26) granting the service provider (18, 20, 22) access to a service provider identification (48) in order for the service provider (18, 20, 22) to run a service application  
10 requested by the first and second clients (12, 14).

2. The method according to claim 1 wherein the method further comprises the position database (28) sending a match signal (72) to the matching  
15 database (24), the match signal (72) comprises service provider identification codes (48) of the first and second clients (12, 14).

3. The method according to claim 1 wherein  
20 the method further comprises the matching database (24) sending an activation signal (90, 92, 94) to the service provider (18, 20, 22), the activation signal (90, 92, 94) comprises the service provider identification code (48) and matching information (56).  
25

4. The method according to claim 3 wherein the method further comprises the service provider (18, 20, 22) receiving the activation signal (90, 92, 94) and the service provider (18, 20, 22) sending an initiation  
30 signal (96, 98) to the first and second clients (12, 14).

5. The method according to claim 1 wherein the method further comprises the first client (12) interacting with the second client (14), the first  
35 client (12) does not have access to the real universal identification (46) of the second client (14).

6. The method according to claim 1 wherein the method further comprises preventing the service provider (18, 20, 22) from having access to the real universal identification (46) of the first and second clients (12, 14).

7. The method according to claim 5 wherein the method further comprises the second client (14) revealing the real universal identification (46) to the first client (12).

8. The method according to claim 1 wherein the method further comprises limiting the position database (28) from including more information about the first and second clients (12, 14) than the operator identification (49), the matching profile parameters (50) and the real time position (52).

9. The method according to claim 1 wherein the method further comprises the operator (30, 32, 34) automatically providing the position database (28) with position information (52) about each client (12, 14) of the operator (30, 32, 34).

10. The method according to claim 1 wherein the method further comprises the position database (28) only providing the match database (24) with the service provider identification (48) when positive replies (80, 82) have been provided by the first and the second clients (12, 14).

1/4

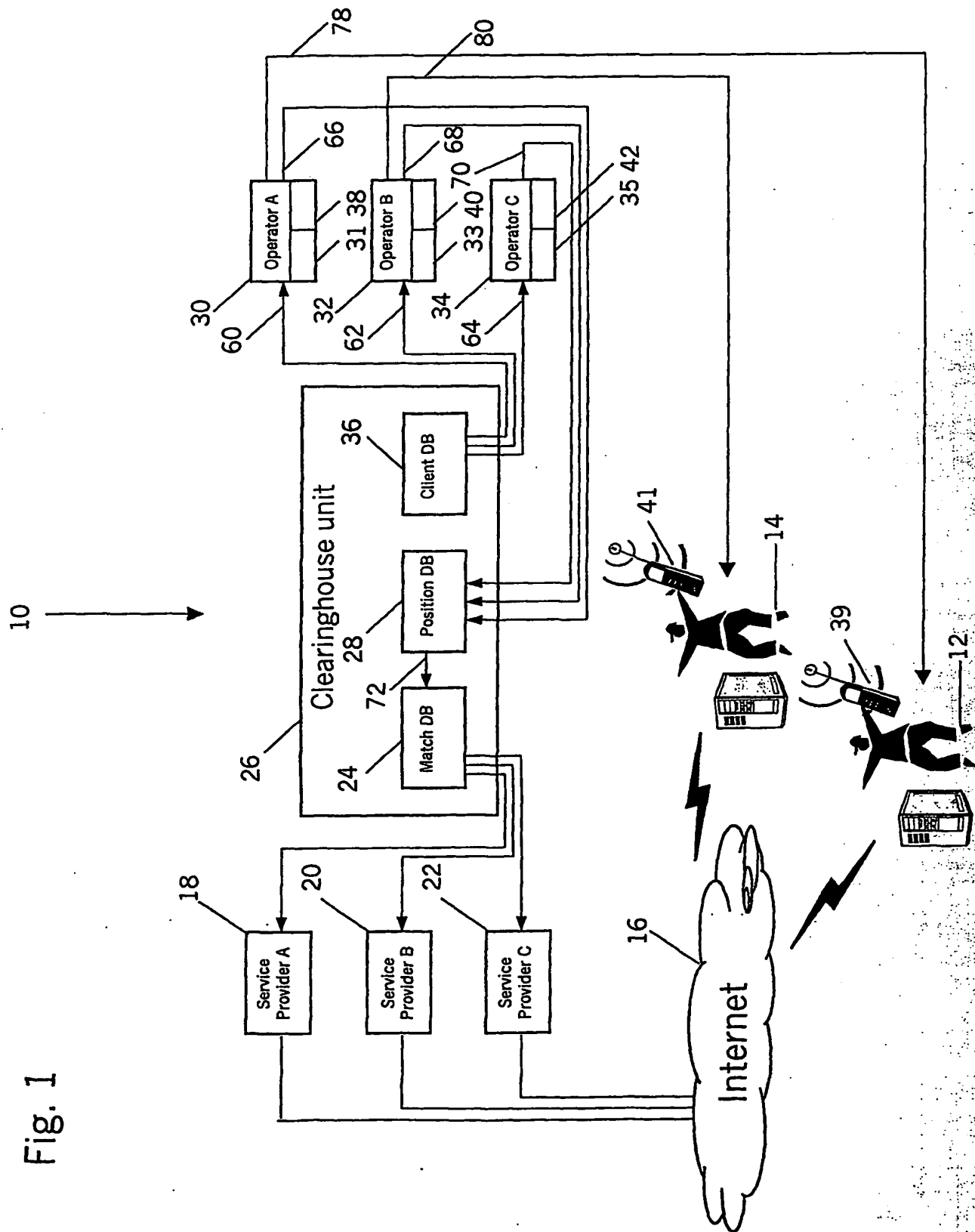


Fig. 1

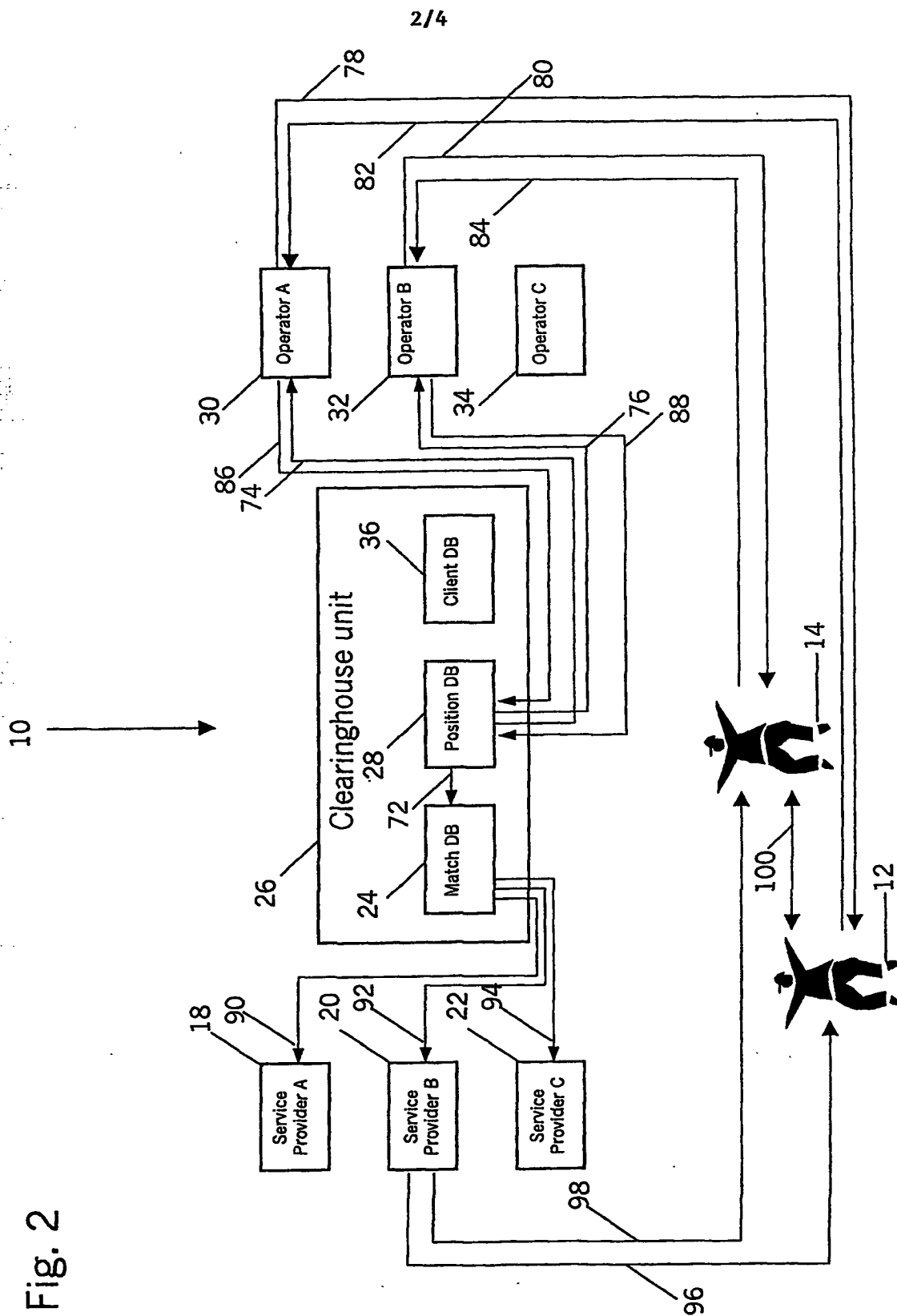


Fig. 2

Fig. 3

36

↓

The Client Database

|       |        |       |               |      |      |
|-------|--------|-------|---------------|------|------|
| 44    | 46     | 48    | 50            | 53   | 55   |
| CH_ID | UUU_ID | SP_ID | MATCH_PROFILE | NAME | Etc. |
|       |        |       |               |      |      |
|       |        |       |               |      |      |
|       |        |       |               |      |      |

Fig. 4

The encoded version of the Client Database

|       |       |        |       |               |
|-------|-------|--------|-------|---------------|
| 49    | 44    | 46     | 48    | 50            |
| OP_ID | CH_ID | UUU_ID | SP_ID | MATCH_PROFILE |
|       |       |        |       |               |
|       |       |        |       |               |
|       |       |        |       |               |

Fig. 5

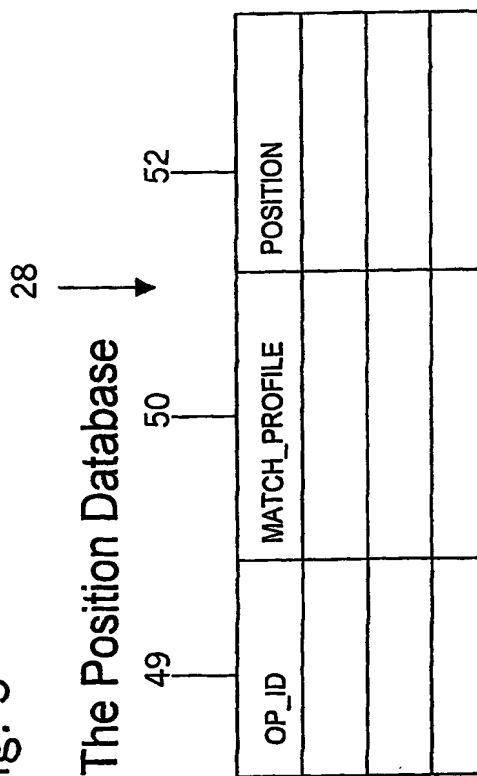
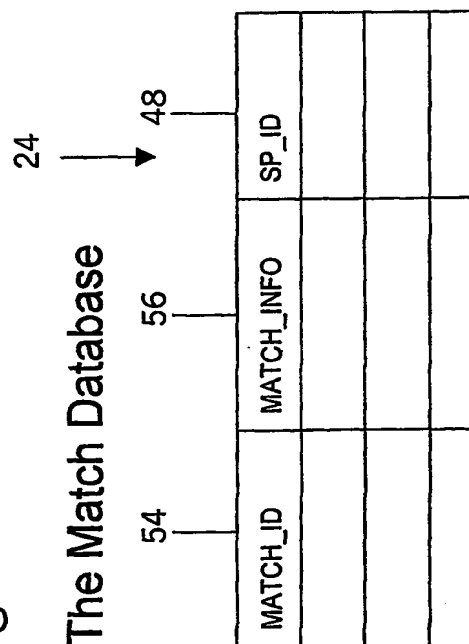


Fig. 6



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 01/01030

## A. CLASSIFICATION OF SUBJECT MATTER

IPC7: H04Q 7/38

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages  | Relevant to claim No. |
|-----------|---|-----------------------|
| P,X       | WO 0115480 A1 (NOKIA CORPORATION), 1 March 2001 (01.03.01), page 4, line 14 - page 5, line 2; page 9, line 10 - page 10, line 23; page 16, line 20 - page 17, line 13<br>-- | 1-10                  |
| P,X       | WO 0126408 A1 (REAL VENTURE GROUP AB), 12 April 2001 (12.04.01), page 2, line 5 - page 4, line 21<br>--   | 1-10                  |
| X         | WO 0019344 A2 (L I M S (MANAGEMENT SYSTEMS)), 6 April 2000 (06.04.00), page 3, line 1 - page 4, line 21; page 8, line 14 - line 23<br>--                                    | 1-10                  |

☒ Further documents are listed in the continuation of Box C.
 ☒ See patent family annex.

## \* Special categories of cited documents

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier application or patent but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

4 Sept 2001

Date of mailing of the international search report

06-09-2001

Name and mailing address of the ISA'

Swedish Patent Office  
Box 5055, S-102 42 STOCKHOLM  
Facsimile No. +46 8 666 02 86

Authorized officer

Stefan Hansson/EK  
Telephone No. +46 8 782 25 00

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 01/01030

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                  | Relevant to claim No. |
|-----------|---|-----------------------|
| X         | US 5086394 A (SHAPIRA), 4 February 1992 (04.02.92),<br>column 2, line 11 - column 4, line 28<br>--- | 1-10                  |
| A         | US 5459859 A (SENDA), 17 October 1995 (17.10.95),<br>abstract<br>--                                 | 1-10                  |
| A         | US 4173016 A (DICKSON), 30 October 1979 (30.10.79),<br>abstract<br>--                               | 1-10                  |
| A         | WO 9827778 A2 (TELEFONAKTIEBOLAGET LM ERICSSON),<br>25 June 1998 (25.06.98), abstract<br>--         | 1-10                  |
| A         | WO 9720441 A1 (TELEFONAKTIEBOLAGET LM ERICSSON),<br>5 June 1997 (05.06.97), abstract<br>--<br>----- | 1-10                  |

**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

02/08/01

International application No.

PCT/SE 01/01030

| Patent document<br>cited in search report |         |    | Publication<br>date | Patent family<br>member(s) |              | Publication<br>date |
|---|---------|----|---------------------|----------------------------|--------------|---------------------|
| WO  | 0115480 | A1 | 01/03/01            | AU                         | 6779100 A    | 19/03/01            |
| WO  | 0126408 | A1 | 12/04/01            | SE                         | 9903571 A    | 06/04/01            |
| WO  | 0019344 | A2 | 06/04/00            | AU                         | 5882099 A    | 17/04/00            |
|   |         |    |                     | IL                         | 126364 D     | 00/00/00            |
| US  | 5086394 | A  | 04/02/92            | AU                         | 5739190 A    | 29/11/90            |
|   |         |    |                     | IL                         | 90277 D      | 00/00/00            |
|   |         |    |                     | JP                         | 4507158 T    | 10/12/92            |
|   |         |    |                     | WO                         | 9013828 A    | 15/11/90            |
| US  | 5459859 | A  | 17/10/95            | DE                         | 69226730 D,T | 11/03/99            |
|   |         |    |                     | EP                         | 0519716 A,B  | 23/12/92            |
|   |         |    |                     | JP                         | 5189452 A    | 30/07/93            |
| US  | 4173016 | A  | 30/10/79            | AU                         | 4845579 A    | 08/01/81            |
|   |         |    |                     | CA                         | 1121864 A    | 13/04/82            |
| WO  | 9827778 | A2 | 25/06/98            | AU                         | 731567 B     | 05/04/01            |
|   |         |    |                     | AU                         | 5353498 A    | 15/07/98            |
|   |         |    |                     | BR                         | 9714143 A    | 29/02/00            |
|   |         |    |                     | CN                         | 1246262 A    | 01/03/00            |
|   |         |    |                     | DE                         | 19782197 T   | 23/12/99            |
|   |         |    |                     | FI                         | 991378 A     | 16/06/99            |
|   |         |    |                     | GB                         | 2335577 A,B  | 22/09/99            |
|   |         |    |                     | GB                         | 9913928 D    | 00/00/00            |
|   |         |    |                     | US                         | 6088598 A    | 11/07/00            |
| WO  | 9720441 | A1 | 05/06/97            | AU                         | 1044397 A    | 19/06/97            |
|   |         |    |                     | JP                         | 2000501259 T | 02/02/00            |
|   |         |    |                     | US                         | 5812950 A    | 22/09/98            |

**THIS PAGE BLANK (USPTO)**

**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☐ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**

**THIS PAGE BLANK (USPTO)**